

OTHERS WERE HERE BEFORE



**Mc
Graw
Hill**

by Jack Rummel
illustrated by Kitty Harvil

McGraw-Hill School Division

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McGraw-Hill School Division
Two Penn Plaza
New York, New York 10121

Book Design and Production: Pronto Design and Production, Inc.

Printed in the United States of America

ISBN 0-02-278599-X/6

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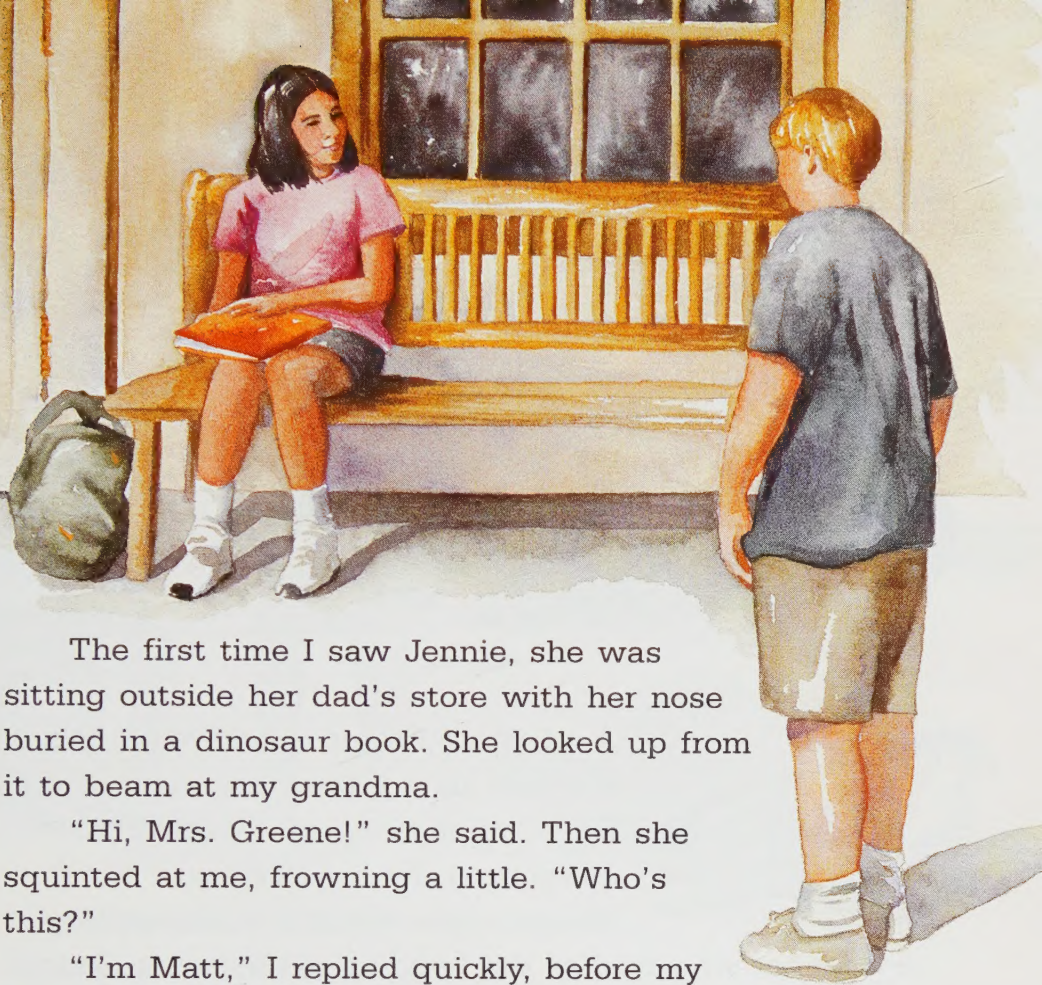
Farmington

Willow Creek, Montana, is a dusty, one-horse kind of town. Actually, according to Jenny Two Crow, it's a six-horse town, and she knows every horse personally.

Jennie's been a friend of mine for two years. She's a member of the Blackfoot tribe. Many of her relatives live farther north on the Blackfeet reservation near the Canadian border. Jennie and her folks have lived in Willow Creek for as long as she can remember.

I first met Jennie when I came to Willow Creek with my mom to spend the summer with my grandma. That was the summer I "met the bones," as Jennie put it.





The first time I saw Jennie, she was sitting outside her dad's store with her nose buried in a dinosaur book. She looked up from it to beam at my grandma.

"Hi, Mrs. Greenel!" she said. Then she squinted at me, frowning a little. "Who's this?"

"I'm Matt," I replied quickly, before my grandma could answer for me. "What's your name?"

"Jennie," said the girl, still studying me. I felt like I was being sized up for a mission. As it turned out, I was.

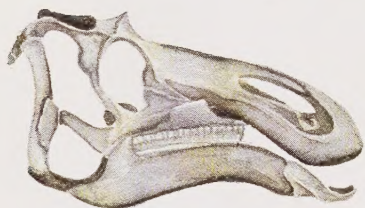
"You like dinosaurs?" asked Jennie.

"If they don't bite," I said.

I grinned at my weak joke, but Jennie didn't. Instead, she asked my grandma, "Would Matt like to come to the dig with me and Dr. Wiggins? We're leaving in five minutes."

"Sure!" I said as my grandma nodded her head. Then I added, "Um ... what's a dig?"

"It's where you can meet dinosaurs," said Jennie. "Don't worry—they won't bite if they like you!"



I figured if anything would bite us it would be a rattlesnake, and Dr. Wiggins could take care of that emergency. As it turned out, Dr.

Wiggins was actually a paleontologist, a scientist who studies the remains of dinosaurs. Jennie clearly considered herself to be the doctor's assistant.

Dr. Wiggins told me a bit about the dig as our truck rumbled down a dirt road over rolling hills.

"Dinosaurs lived at this site about 75 million years ago," she explained. "Our crew has been digging here for a few years now."

The dig site was filled with men and women carefully digging and chipping at the soil. We hopped out of the truck and headed toward one group of workers. The three of us crouched by a pile of rocks.

Then Dr. Wiggins placed a heavy, oval rock in my hands. It was about a foot long and covered with cracks. Jennie whispered, as if letting me in on a huge secret, "Others were here before."



"What kind of rock is this?" I asked.

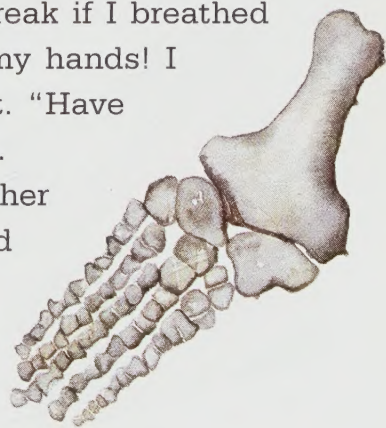
Jennie snickered.

"It's a dinosaur egg," said Dr. Wiggins. "It was laid about 75 million years ago. During that time, minerals replaced most of the original material in the egg. The egg basically turned into stone."

Suddenly my hands felt sweaty and slick. The egg felt like a glass bubble that might break if I breathed on it. A 75-million-year-old egg—in my hands! I hoped I wouldn't accidentally drop it. "Have you found other eggs here?" I asked.

"Oh, yes," said Dr. Wiggins. "Other fossils, too. Usually we find eggs and other fossils together."

"Do you know what a fossil is?" asked Jennie quickly.





"Dinosaur bones," I answered, glad to be able to show Jennie that I knew *something*.

"That's partly right," said Jennie. "Fossils are the remains of anything that lived over 10,000 years ago. They can be bones, eggs, footprints, bits of wood, shells, and pieces of plants."

She showed me a page in her book of a dinosaur becoming a fossil.

"Not everything turns into a fossil, however," added Dr. Wiggins. "For example, a dinosaur that died out in the open wouldn't turn into a fossil. Its bones would be scattered by other animals and worn away by wind and water. A dinosaur that got buried in mud or sand, however, was protected. It turned into a fossil as the mud and sand around it turned into rock over time."

I ran my hands over the egg. "What kind of dinosaur laid this?" I asked Dr. Wiggins.

"A hadrosaur," she said. "Hadrosaurs ate plants, not meat. They were a common kind of dinosaur—so common

that they're sometimes called 'the cows of the Cretaceous.'"





"The Crétaceous is the name of the time period they lived in," added Jennie. "It lasted from about 140 million years ago to about 65 million years ago—when dinosaurs became extinct. It's the end of a bigger period of time called the Mesozoic Era, the age of dinosaurs."

"This place looked really different then," said Dr. Wiggins. She gazed around at the dig. "The Rocky Mountains were smaller. A sea lay just 200 miles east of here, in the middle of what is now the United States. There were tall plants that looked like palm trees. No hawks—just flying reptiles. No cows ..."

"... but plenty of Cretaceous cattle!" I said.

We spent the rest of the afternoon helping the crew chip dirt away from a dinosaur nest. It was slow, hot work. Flies buzzed around my head and landed on my sweaty neck. I was glad to see my mom arrive to pick me up around dinnertime.

Just before I left, Jennie handed me her dinosaur book. She stuck a leaf into the middle.

"Check out these pages," said Jennie. "Then, when you come back tomorrow, you'll know a thing or two about hadrosaurs."

On the way back to my grandma's, I flipped through the book, reading interesting bits to my mom.

"Some hadrosaurs were as long as a school bus," I told her, "and weighed three tons. That's as much as about six horses!"

"How'd you like to feed and clean up after a beast like that?" asked Mom.





That night, after dinner, I lay in the porch swing and started reading Jennie's book. I decided I'd show her a thing or two tomorrow at the dig.

First, I wanted to get a clue as to how long 75 million years was. I couldn't even imagine that time span. One year before, I'd been in sixth grade. Fifty years ago, my mom hadn't even been born. A hundred years ago, more or less, people started using electricity in their homes.

I didn't have to read very far to find out how different the world was back then. For one thing, there were no humans. The world was ruled by dinosaurs, the biggest reptiles that ever lived.

I read on. I read about layers of rock containing dinosaur bones. I read about fossilized *Tyrannosaurus rex* skulls. I read about microfossils—fossils so small they could only be seen with a microscope. Then, suddenly, my mom was shaking my shoulder.

"Wake up, mister!" she said. "Get upstairs to bed if you want to get a good night's sleep!"

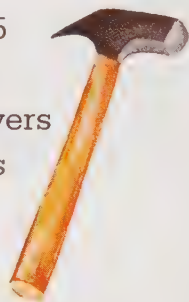


In the morning, I watched my grandma stack pancakes on my plate. Suddenly I had a brainstorm.

"Hey, listen to this," I said. I pointed to the pancakes and cleared my throat as my puzzled mom and grandma looked at my breakfast.

"OK, yesterday Dr.

Wiggins told me about this dinosaur that lived 75 million years ago," I said. "Then last night I read that you can find this dinosaur only in certain layers of rock. You see, many rocks are formed from bits and pieces of other rocks that are carried by wind and water. They are deposited, or dropped off, on Earth's surface like new pavement on a highway. They form layers. Some of the layers form from volcanic eruptions."



I took a breath and continued, "The layers are like pancakes. The oldest, or the first one cooked, goes on the bottom. The most recent, or last one cooked, goes on the top."

I was really on a roll now. "Sometimes the old layers get exposed because of erosion—when the rock and soil get worn away. Like this." I cut a wedge out of the stack. "When that happens, you can search the lower layers for fossils!"

"Great," said Mom. "But how about eating your layers before they get cold?"

When Dr. Wiggins's truck pulled up in front of our house, I leaped inside and started firing questions at her. Jennie barely got a word in edgewise.



"So the layers of rock on Earth's surface are like a time line, right?" I asked. "You can tell how many millions of years old a rock layer is by the kind of animals you find inside it?"

"Yes," said Dr. Wiggins. "You can also do the reverse. You can figure out the age of a rock to find out the age of a fossil. To do that, you measure the amount of rock ingredients called radioactive elements. They break down and disappear over time. New elements form in the rock. You can figure out how old the rock is by the amounts of the old and the new elements that are in it."

When we got to the site, Dr. Wiggins teamed Jennie and I with a college student named Paul. Paul gave us small ice picks to dig with and whisk brushes for brushing dirt away from any fossils we found.



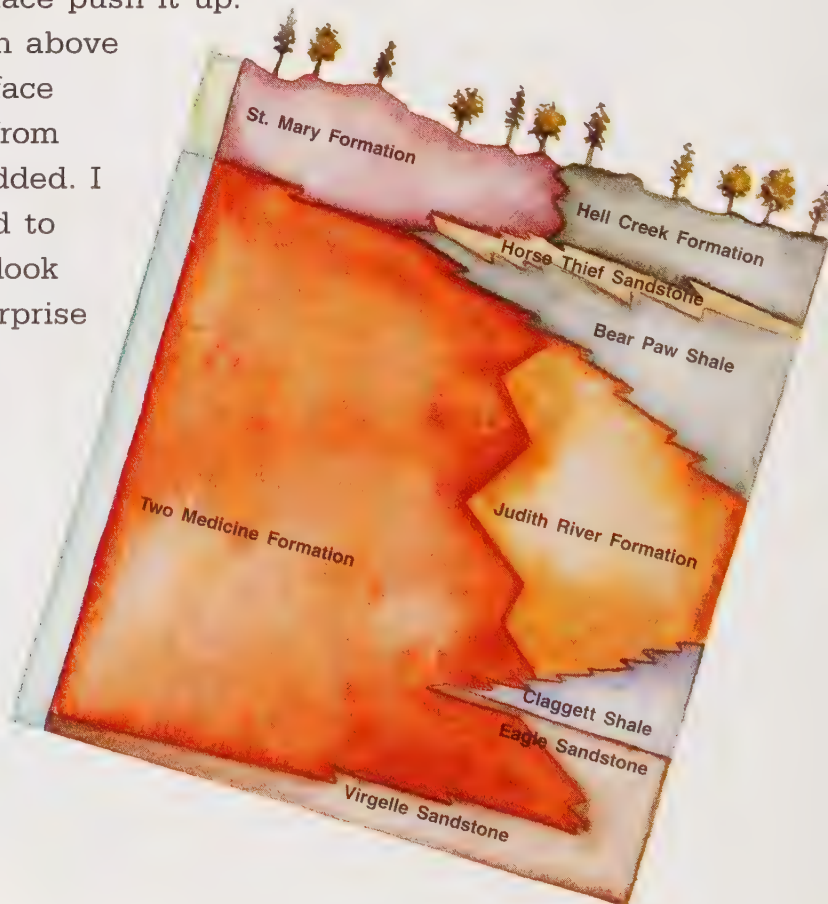
Jennie and I chatted a lot about fossils and layers as we helped Paul poke around in the dirt.

"This spot we're on right now," said Jennie, "was once beneath a slow-moving stream. It carried mud here and laid it down in layers."

Mudstone, I thought. I'd read about it the night before. "So all that mud was squeezed down over millions of years into a layer just 20 feet deep?" I wondered out loud.

"Yes," said Jennie, looking at me in surprise. "This dig is part of something called the Two Medicine Formation. It's not just mudstone. It also has sandstone and a soft rock called shale, which has a lot of clay in it. Most of the Two Medicine formation is far underground. It pops up in places, like it does here, when forces below Earth's surface push it up."

"Erosion above Earth's surface exposes it from above," I added. I was pleased to see Jennie look at me in surprise once again.





Dr. Wiggins came over around noon to see how we were doing. We all took a break for lunch. Jennie had brought a feast prepared by her mom—chicken sandwiches, salad, and fresh peaches, washed down with lemonade.

“I would love to find something really huge and wonderful in the rocks someday,” said Jennie. “Like a *T-rex* skull. That would be so cool.”

Dr. Wiggins smiled. “That would be an incredible find,” she said. “Things like that don’t turn up every day! Some of the most important finds don’t make headlines, however. Some of them are so small, you need a microscope to see them.”

“Microfossils!” I shouted. This time, both Jennie and the doctor stared at me in astonishment.

“Dr. O.C. Marsh, I presume?” laughed Jennie. I laughed, too. I recognized the name as that of a famous paleontologist who discovered a lot of fossils in the western United States over 100 years ago.

Foraminifera

"Matt's right," said Dr. Wiggins. "Microfossils such as pollen grains are clues as to what kinds of plants lived in ancient times. You can even find fossils of bacteria and algae. You can figure out the age of some rock layers by looking for tiny fossil shells left behind by forams."



"What's a foram?" asked Jennie.

I was surprised that Jennie had a question instead of the answer.

"A foram is a one-celled organism that lived in the oceans," explained Dr. Wiggins. "We know a lot about the history of forams. So if you find foram shells in a slab of rock, you can check to see what time period those forams lived in. If you know the age of the forams, you know the age of the rock!"

Jennie flipped madly through the pages of her book until she found pictures of forams.

After lunch, we went back to digging, scraping, chipping, and brushing. Sweat ran down my back as the Sun beat down on me. Just as I was ready to call it quits, I saw something appear beneath my brush.

"Jennie, look at this," I called. Jennie was only half listening. I looked up to see her staring hard and pointing at the ground in front of us.

"Matt, do you see something here?" she asked.

There in the soil was something that looked like a pencil rubbing of a creature. Part of a creature, that is—a head and a neck. Down where I was working were a few more details—something that looked a bit like a foot.

Paul trotted over to check out our discovery. "Hey, I was wondering if one of those would turn up," he said, grinning broadly. "Looks like a baby hadrosaur to me!"





"Wow!" shouted Jennie and I at the same time. We watched as Paul pointed out the bones just starting to show through the rock and dirt.

"Here's the round part of the skull that holds the eye," he explained. "Baby dinosaurs have very big eyes for their size. It looks like Matt also found a toe!"

We gazed at the faint image of the little dinosaur that would have grown to be larger than an elephant.

"This is cool," said Jennie. "Definitely as cool as a big old *T-rex* skull."

"You know something, Jennie?" I said. "You were right. Others were here before."

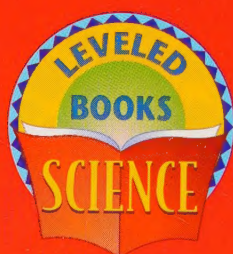
Jennie smiled, then gave me a high-five. "You know what?" she said. "That's what they'll say about us someday."

Read Aloud Activities for School and Home



Timeline Working in groups, identify Willow Creek, Montana on a map. Then, draw a timeline from the period that dinosaurs lived in Montana (75 million years ago) to the present. Relate your timelines to details from the story, including Matt's discovery of the hadrosaur fossil.

Write a Letter With a friend or family member, write a letter (you don't have to send it!) to the Museum of the Rockies in Bozeman, Montana. The museum has a collection of fossils found at the Two Medicine formation. Explain that you read a book about the site; then ask five questions that you'd like to know about the Two Medicine formation.



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ISBN 0-02-278599-X



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